



UNIVERSAL WIRELESS PROGRAMMER

EDL Project

S-01 Tue-16

FEEDBACK

Feedback received and the actions taken

Feedback #1

We should shift our focus from data transmission and processing to uploading the hex file as it is the core part of the project



Action Taken

We worked on:

- Arduino UNO programming via USB
- Arduino UNO programming via Rx/Tx
- ATmega328P programming via ISP
- Implemented FSM in code for ensuring the correct sequence of commands in STK500

Feedback #2

- To get Arduino UNO board in bootloader mode, we had to reset the arduino using the DTR but we were unable to toggle the DTR.
- Feedback was to go with external reset pin initially to test the remaining logic.



Action Taken

- Accessing the reset pin of Arduino required connection to be made using the user which we didn't want so we came up with an alternative solution.
- Successfully reset the Arduino by toggling the Vbus of the USB line which resets the board without need of any connection to be made by the user.

VIDEO DEMO

https://drive.google.com/file/d/15jDmXWwqaXc6rQoXRVJzBOzRTteQjFtX/view?usp=sharing

uart workspace - Device Configuration Tool - STM32CubeIDE

File Edit Navigate Search Project Run Window Help

Project Explorer

usb_host.c main.c usb...

receiver_signature_led_program.ioc

COM5 - PuTTY

Board Programmer

Board Selection

Arduino UNO Select Board

File Operations

Load HEX File Loaded File: Blink.ino.hex

Byte Count	Address	Record Type	Data	Checksum
16	0000	00	0C945C000C946E000C946E000	CA
16	0010	00	0C946E000C946E000C946E000	A8
16	0020	00	0C946E000C946E000C946E000	98
16	0030	00	0C946E000C946E000C946E000	88
16	0040	00	0C9413010C946E000C946E000	D2
16	0050	00	0C946E000C946E000C946E000	68
16	0060	00	0C946E000C946E00000000024	29
16	0070	00	2A0000000000250028002B0004	CE
16	0080	00	0404040402020202020203030C	42
16	0090	00	010204081020408001020408102	1F
16	00A0	00	04081020000000080002010000C	FB
16	00B0	00	000000000000000011241FBECF	B8
16	00C0	00	DEBFCDBF21E0A0E0B1E001C0	AC
16	00D0	00	8207E1E705945D0010C946C010	82

UART Settings

COM3 - Prolific USB-to-Serial Con 38400 Refresh Connect Disconnect Status: Connected

Programming Controls

Check Signature Program Device

VIEW

PC10 PA15 PA14

VDD VSS PA13 PA12 PA11 PA10 PA9 PA8 PC9 PC8 PC7 PC6 PB15 PB14 PB13 PB12

VCAP1 VSS VDD

USB_OTG_FS_DP USB_OTG_FS_DM USART1_RX USB_OTG_FS_VBUS

Unused GPIOs: 38 / 50

Updates Available

Updates are available for your software. Click to review and install updates. You will be reminded in 4 Hours. Set reminder preferences

3°C make

ENG IN 9:22 AM 3/23/2025

PCB STAGE

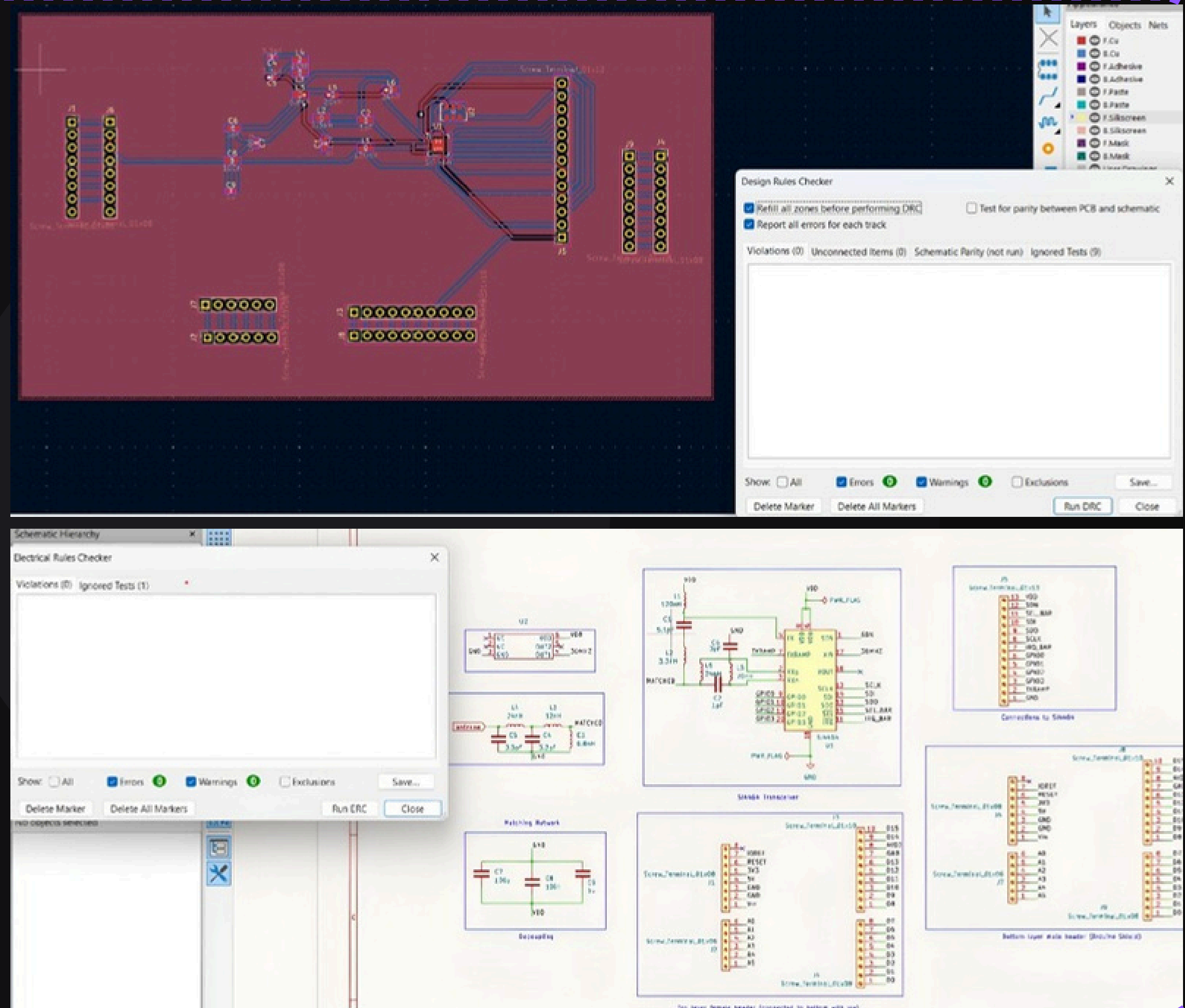
Work that has been done:

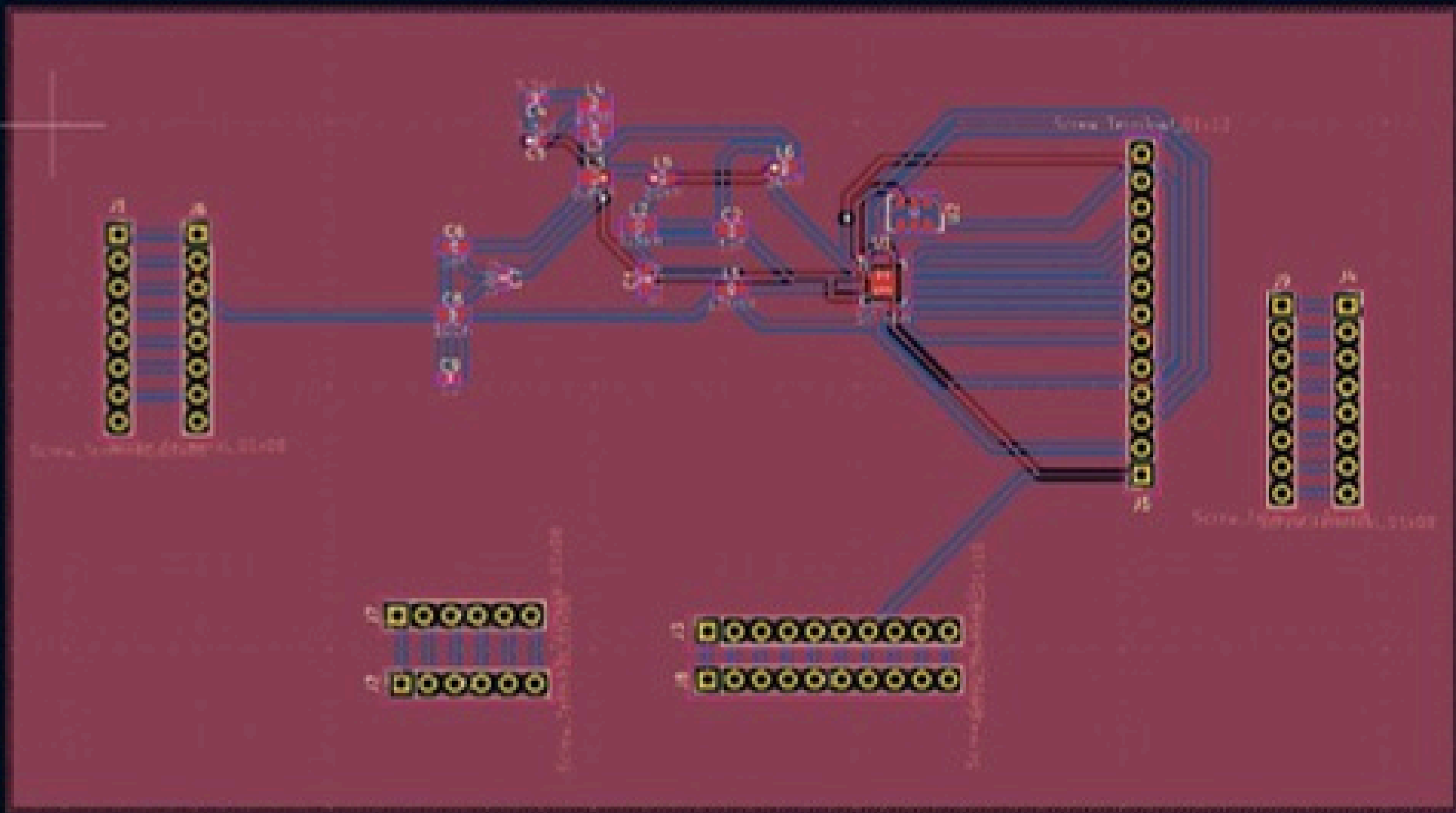
- PCB Schematic ✓

- PCB layout ✓

- The PCB is a breakout board with matching network and all other required parts for the transceiver IC.

- We have designed it like an arduino driver shield to attach it directly over the stm32 arduino ports





Design Rules Checker

- ☒ Refill all zones before performing DRC
- ☒ Report all errors for each track

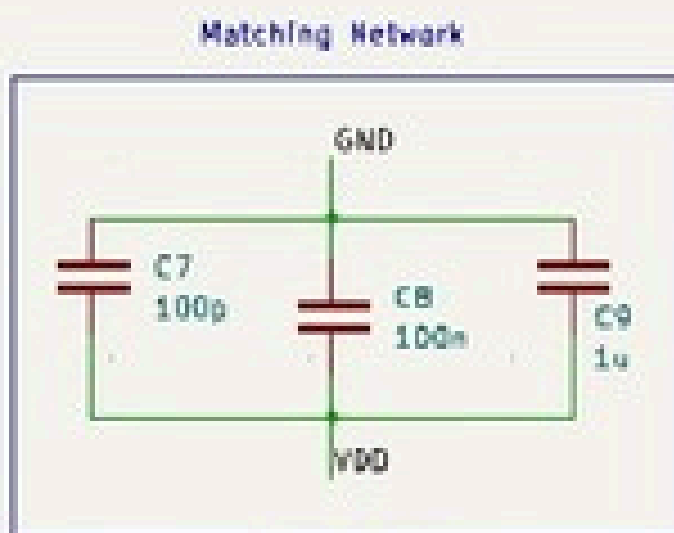
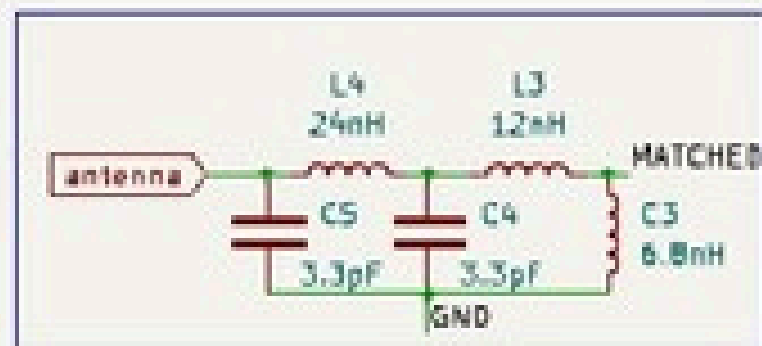
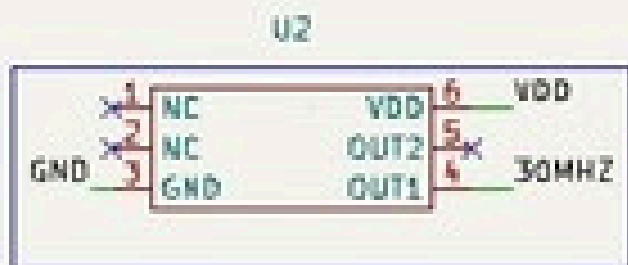
☐ Test for parity between PCB and schematic

Violations (0) Unconnected Items (0) Schematic Parity (not run) Ignored Tests (0)

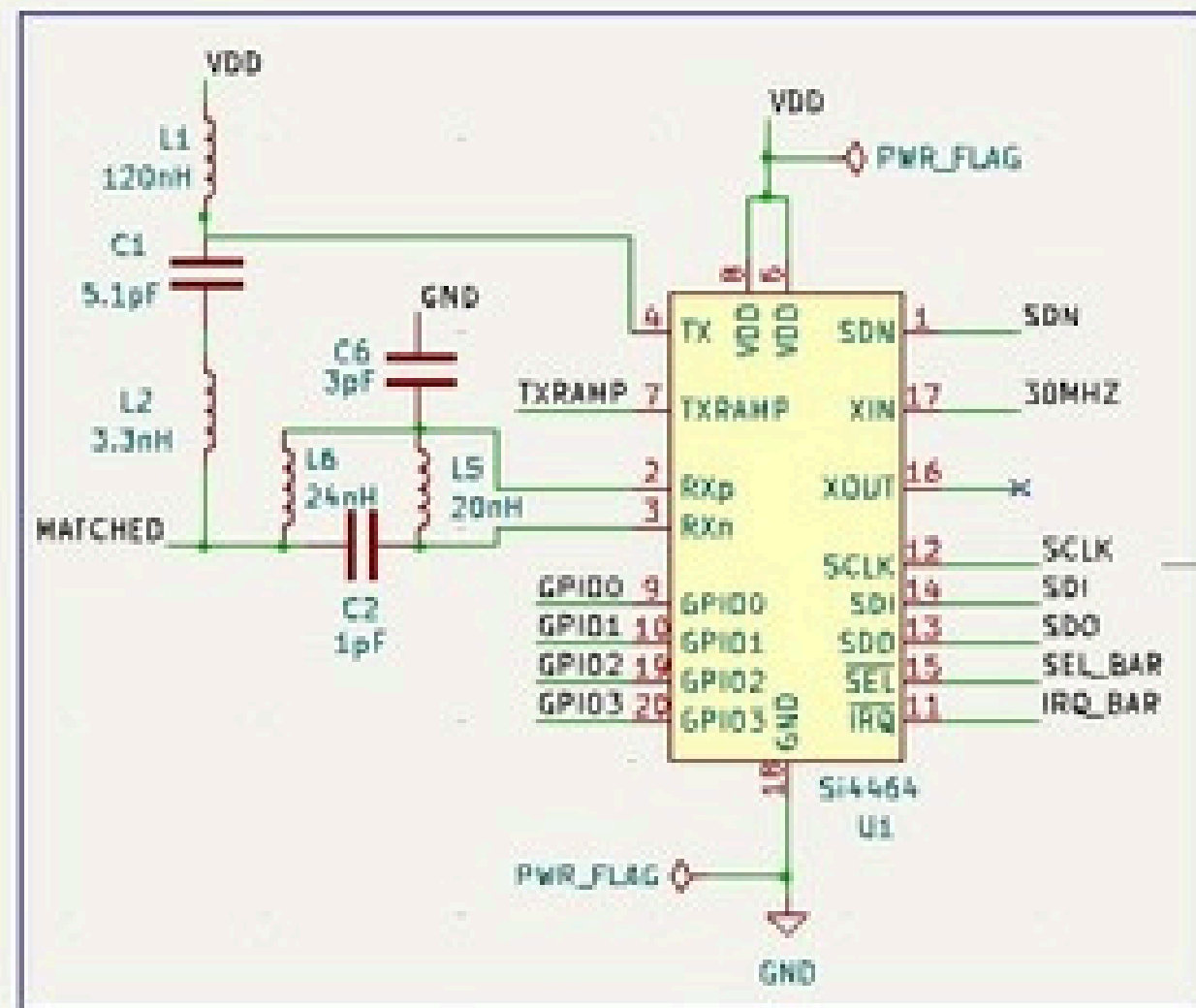
--

Show: ☐ All ☒ Errors ☒ Warnings ☐ Exclusions

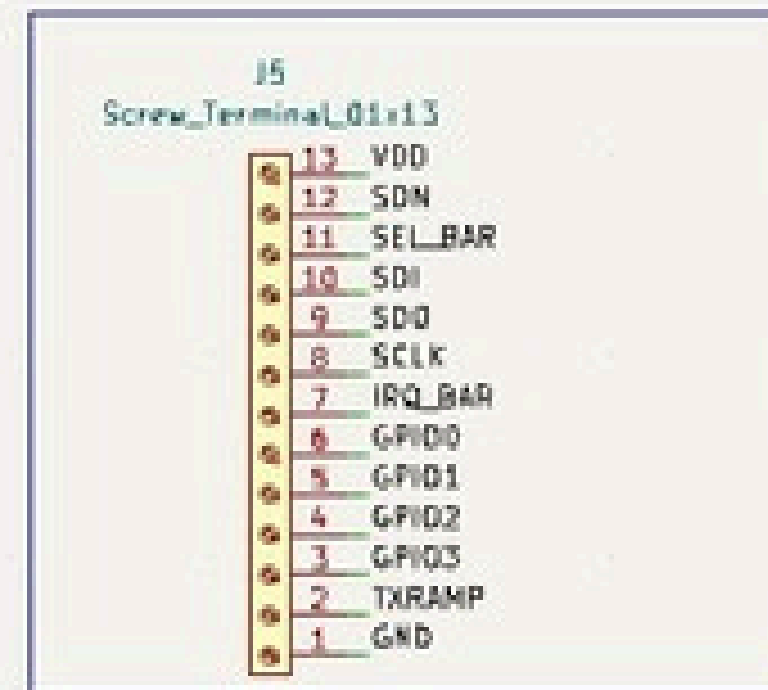
Delete Marker Delete All Markers Run DRC Close



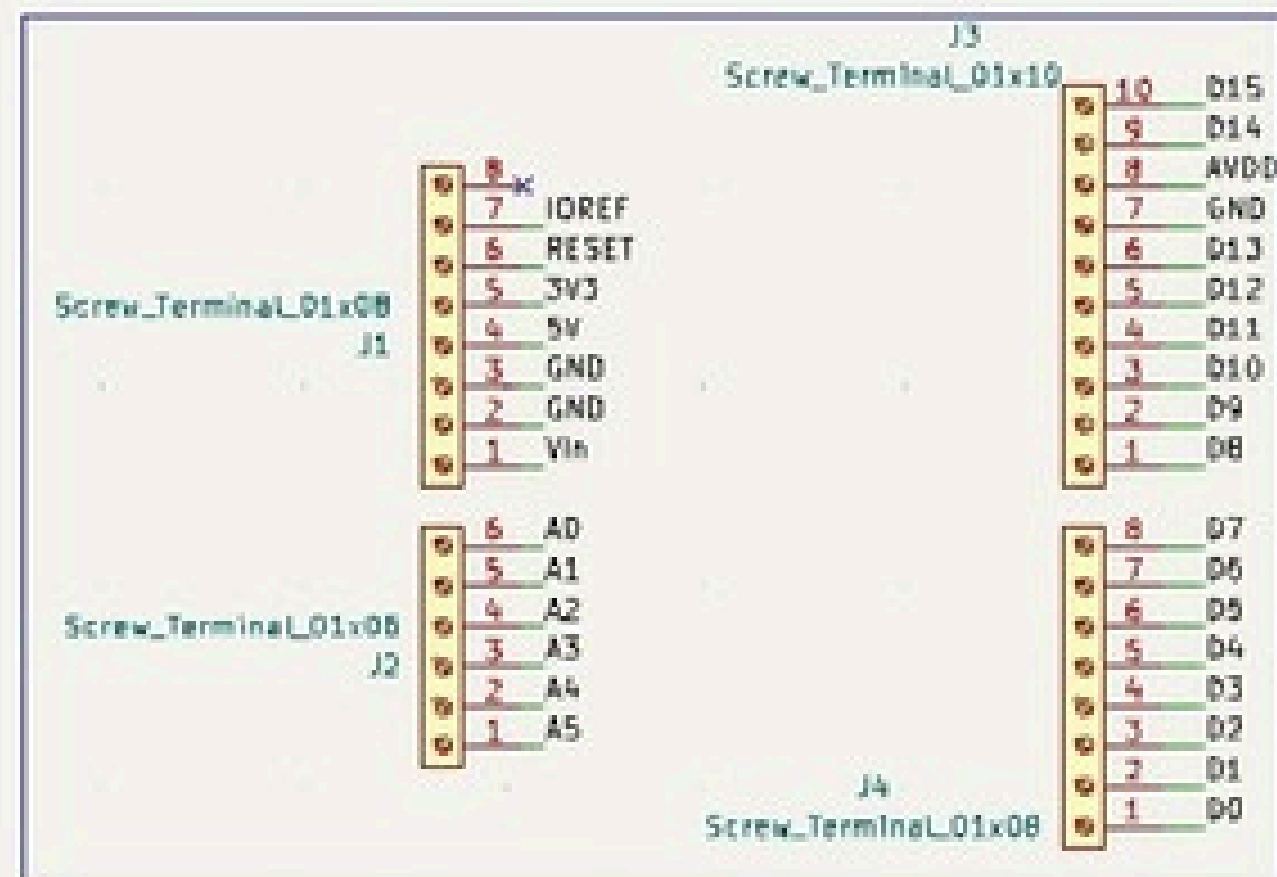
Decoupling



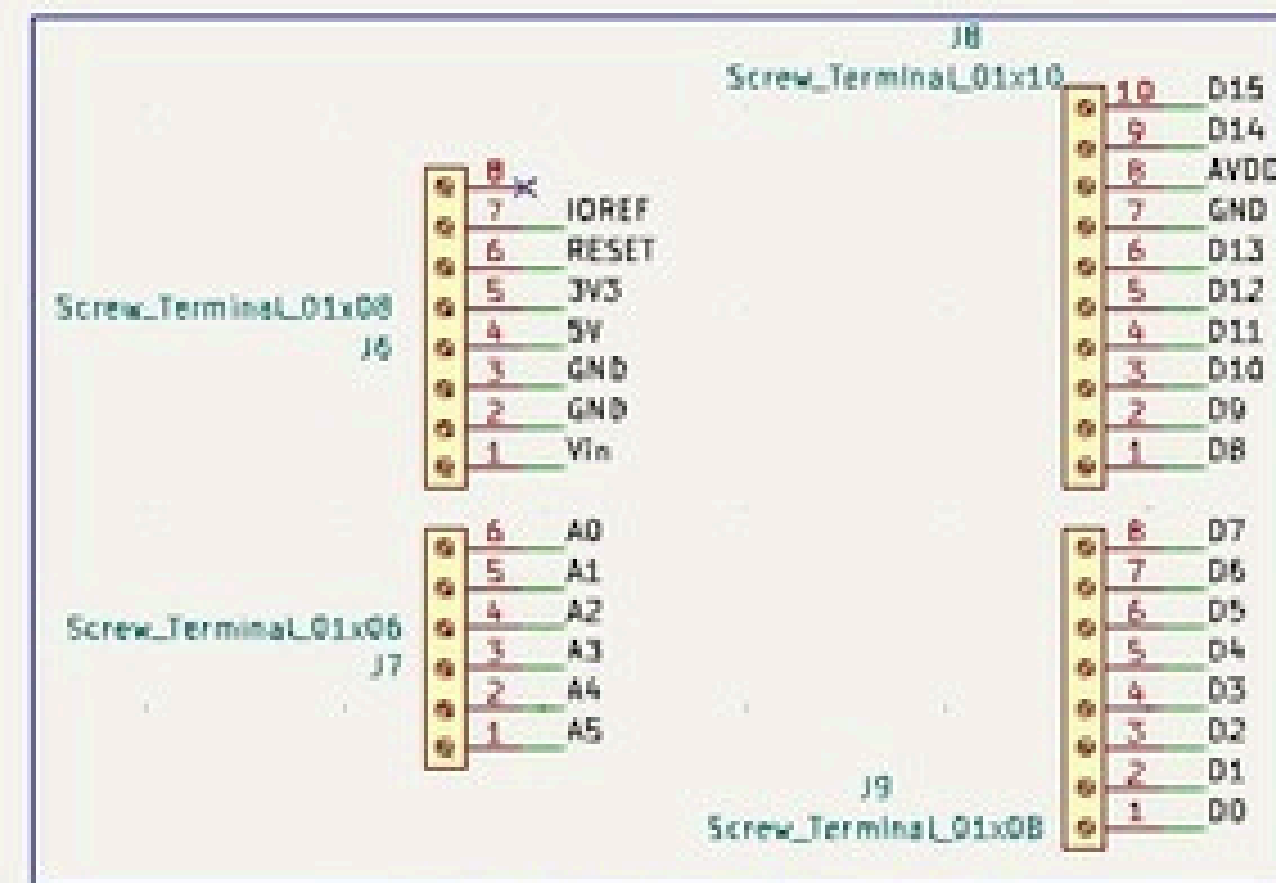
SI4464 Transceiver



Connections to SI4464



Top layer female header (connected to bottom with via)



Bottom layer male header (Arduino Shield)

PCB FORM

We have not done reviews. The reasons for the delay are as follows:

- The SI4464 IC for which we are making the breakout board arrived on this Tuesday
- Trying to get the uploading of hex file to arduino done as it is the most crucial bottleneck of the project.
- Earlier discussed and scheduled a review with Maheshwar sir on 25th, March.

****However, we have completed the layout and resolved all errors and warning, to be reviewed this Tuesday.**



Critical / Incomplete Tasks

Work-in-progress

- Need to implement the STKv500 protocol correctly for being able to program Arduino and ATmega328P
- Establish proper CDC communication between Arduino and STM to be able to communicate and transmit commands

Incomplete

- PCB Assembly for RF IC - SI4464
- Replacing HC05 with RF IC - SI4464
- Serial Data Transfer back from Arduino to the PC GUI.
- Getting the Arduino in sync with stk command, and uploading the hex file.

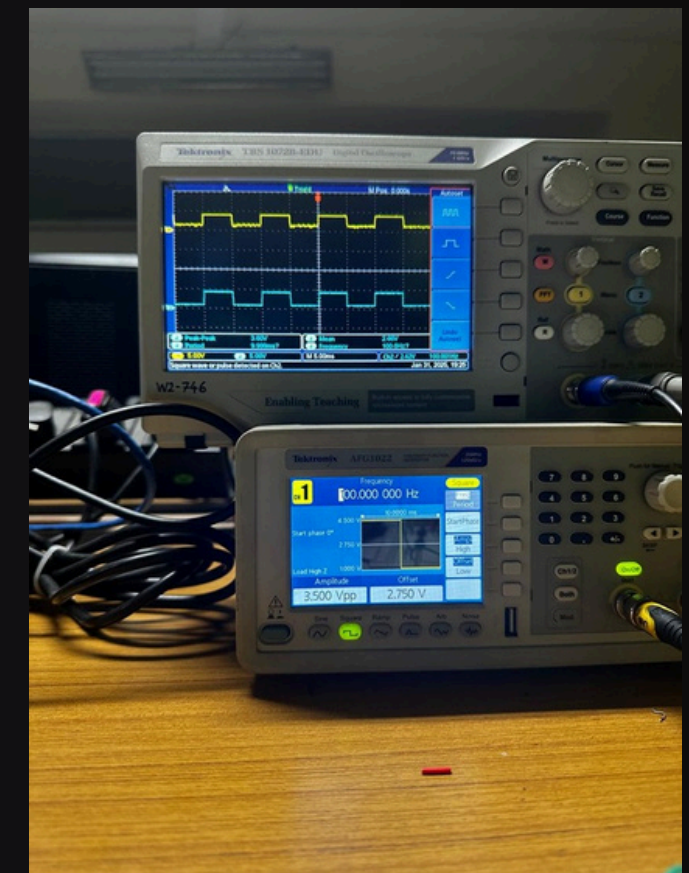
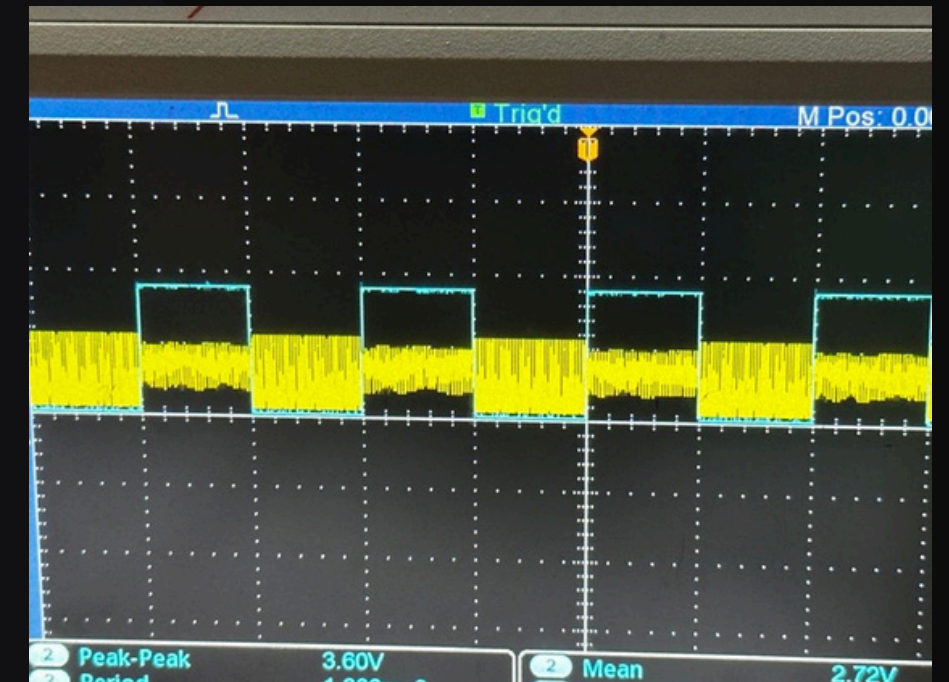
Work in progress

**Custom RF Modulation-Demodulation testing

- Implemented a 2-FSK modulation-demodulation using CD74HC4046A
- The IC is working correctly as was desired over a good frequency range.



Critical / Incomplete Tasks





Key Risks

- Reset using Vbus toggling is working fine but may cause a timing issue as the USB communication gets broken.
- Replacing HC-05 with SI4464 ensuring proper working with the PCB.
- Getting the bootloader on sync with STK500 protocol for the hex file to be flashed.

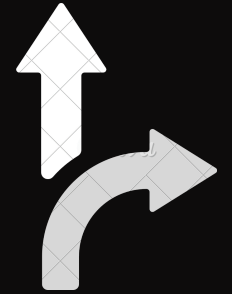
GANTT CHART

DEVIATIONS

					6	13	20	27	3	10	17	24	3	10	17	24	31
					Ja	Ja	Ja	Ja	Fe	Fe	Fe	Fe	Ma	Ma	Ma	Ma	Ma
					25	25	25	25	25	25	25	25	25	25	25	25	25
TASK DESCRIPTION	PLAN START	PLAN END	ASSIGNED TO	Color	1	2	3	4	5	6	7	8	9	10	11	12	13
Milestone 3	2/20/2025	3/22/2025															
ISP Protocol	-	-	Dhruv, Anay, Hardik, Kaustav	-													
RFIC - breadboard testing	2/20/2025	3/5/2025	ALL	R													
PCB Layout	3/5/2025	3/15/2025	Anay, Hardik	P													
Custom RF (if time permits)	3/15/2025	3/20/2025	ALL	G													
PCB Assembly	3/20/2025	3/22/2025	ALL	O													

Original Gantt Chart

GANTT CHART DEVIATIONS



RFIC Breadboard Testing

- We could not test the RFIC on breadboard. We have submitted our PCB design for the RFIC which we will test once we get it back.

PCB Layout

- Kaustav and Saptarshi were responsible for the layout. The changes were made because we made a mistake in the Gantt chart earlier.

Custom RF

- We are no longer implementing custom RF due to insufficient time.

Programming via USB

- Since we could not complete programming the arduino via USB in milestone 2, we continued with the work for milestone 3.

PCB Assembly

- PCB assembly is not finished. We received the components really late and we only had to make a breakout board. So instead we focused on the programming part.

GANTT CHART

DEVIATIONS

					6	13	20	27	3	10	17	24	3	10	17	24	31
					Ja	Ja	Ja	Ja	Fe	Fe	Fe	Fe	Ma	Ma	Ma	Ma	Ma
					25	25	25	25	25	25	25	25	25	25	25	25	25
TASK DESCRIPTION	PLAN START	PLAN END	ASSIGNED TO	Color	1	2	3	4	5	6	7	8	9	10	11	12	13
Milestone 3	2/20/2025	3/22/2025															
Code upload via USB	2/20/2025	3/22/2025	Hardik, Anay	R													
Code upload via ISP	3/2/2025	3/22/2025	Dhruv, Saptarshi, Kaustav	P													
PCB Layout	3/20/2025	3/22/2025	Kaustav, Saptarshi	G													

Updated Gantt Chart

WORK DISTRIBUTIONS



Code Upload on Arduino UNO

Team Member: Hardik, Anay

- Responsible for dumping the hex file from STM to the Arduino UNO using the USB interface and Uart.

RF_IC Communication

Team Member: Kaustav, Saptarshi

- This task involves transitioning from the HC-05 Bluetooth module to SI4464

Code Upload using ISP

Team Member: Dhruv, Saptarshi, Kaustav

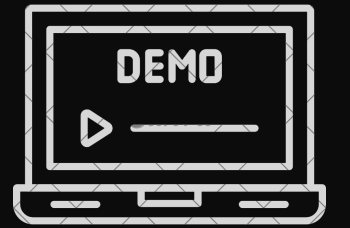
- This task involves programming the standalone ATmega328P microcontroller using an In-System Programmer (ISP)

PCB Implementation

Team Member: All

- This task involves soldering components onto the PCB and conducting thorough testing for final demo

FINAL DEMO PLAN



Wireless Code Upload to Arduino Uno Development Board:

- Upload code wirelessly from a PC to the Arduino Uno using the Nucleo board as an intermediary, communicating via HC-05 Bluetooth or SI4464 RF IC — eliminating the need for USB connections.

Wireless Programming of Standalone ATmega328P Microcontroller:

- Wirelessly program the ATmega328P chip directly using the Nucleo board for In-System Programming (ISP).



THANK YOU

